

What is claimed is:

1           1. . A cache table management device used in a router  
2 wherein the device comprising:

3           a forwarding table having a plurality of entries, each  
4 of said entries having a set of information showing a collection  
5 of addresses comprised of prefix bits and prefix lengths,  
6 information showing packet output paths for the address  
7 collection, the priority level information, and said forwarding  
8 table being searched by a longest prefix match search;

9           a cache table for, when entries are substituted, being  
10 written the entry group containing the entry to be substituted  
11 and the applicable child of the substituted entry from the  
12 forwarding table, and for being deleted on moved , when deleting  
13 or moving entries, the entry group containing the applicable  
14 entry and the applicable parent of the deleted on moved entry;

15           a hit record database containing hit information added  
16 to the contents of the applicable entry among all entries of  
17 the forwarding table, contents of said hit record database being  
18 updated when a hit occurs in the forwarding table or the cache  
19 table;;

20           a packet processing circuit to extract the destination  
21 network address from an input packet ,to search the forwarding  
22 table or the cache table using the destination network address  
23 as a key, and to transmit the packet on the acquired output paths;  
24 and

25           an entry selection circuit to select entry groups to be  
26 interchanged when needed while taking the information from the  
27 bit data base and priority level information into account.

1           2. . A cache table management device used in a router  
2 according to claim 1, wherein the cache table is divided into  
3 a plurality of zones, and the interchanging, deletion or movement  
4 of entry groups is performed in the respective zones.

1           3. A cache table management device used in a router  
2 according to claim 1, wherein the router entry selection device  
3 comprising:

4           an entry group typical value circuit to receive entry group  
5 information from the hit database, and determining from the entry  
6 group information a typical value for evaluating entry usage  
7 status, and a typical zone value and/or typical threshold value  
8 in the entry priority level;

9           a comparator circuit, having a table linking the entry  
10 groups already present in the cache table 102 and the typical  
11 values for those entry groups, for comparing the typical values  
12 of the entry group and the typical values sent from the entry  
13 group typical value circuit, and for sending the priority  
14 rankings of the entry groups present in the cache table;

15           an arbitrator circuit to determine the final interchanging  
16 ranking of the entry group based on the priority rankings sent  
17 from the comparator circuit; and

18           an entry determiner circuit to monitor available space  
19 in the cache table and to delete cache table entries from low  
20 ranking entries determined by the arbitrator circuit and to send  
21 information to the comparator circuit on the deleted entry groups  
22 for deletion from the cache table when no empty space is available  
23 after checking for available space to add an entry group.

1           4. . A cache table management device used in a router  
2 according to claim 3, wherein the values for evaluating the entry  
3 usage status are the hit count and the hit time.

1           5. A cache table management device used in a router  
2 according to claim 3, wherein the typical values are the maximum  
3 value among the threshold value and zone, the average value among  
4 the hit counts, and the most recent value among the hit times.

1           6. A cache table management device used in a router  
2 according to claim 3, wherein said attributor circuit generates  
3 a random number from 0 to 1, divides the random number into two  
4 parts, and allots each part of a hit count and hit time, and  
5 has the ranking of the allotted attribute the final ranking.

1           7. A cache table management device used in a router  
2 according to claim 3, wherein the cache table management device  
3 is further comprising a means for setting the entry priority  
4 level according to information acquired from the received packet.

1           8. A cache table management device used in a router  
2 according to claim 5, wherein the priority level within entries  
3 of the forwarding table is rewritten according to the policy  
4 server.

1           9. A medium for recording programs implemented in a  
2 router, wherein the program comprising the steps of:

3           (a) implementing on a recording device, a forwarding table  
4 containing a plurality of entries each of which includes  
5 information showing the collection of addresses comprised of  
6 prefix bits and prefix lengths, information showing the output  
7 paths of packets for the collection of addresses and priority

8 level information, said entries being searched by longest prefix  
9 method;

10 (b) implementing the cache table on a recording device,  
11 when an entry of said cache table is interchanged, the entry  
12 group comprised of the entry to be added and the child entry  
13 of the applicable entry is written from the forwarding table,  
14 or when an entry is to be deleted or moved, the entry group  
15 comprised of the entry for interchanging and the parent entry  
16 of the applicable entry is deleted or moved;

17 (c) implementing the hit database of all entries of said  
18 forwarding table on a recording device wherein said hit  
19 database or said hit information of said all entries and are  
20 update when a hit occurred in the forwarding table or cache table;

21 (d) implementing the packet processing circuit in said  
22 router extracting the destination network address from the  
23 applicable packet header of the input packet, searching the cache  
24 table or forwarding table using the destination network address  
25 as a key, and for sending the packet on the acquired output path;

26 (e) implementing entry selection circuit on the router for  
27 selecting the entry group to be interchanged by taking into  
28 account the priority level information and the information from  
29 the hit database when interchanging an entry group.

1 10. A recording medium recorded on a program for  
2 implementing the router according to claim 5, wherein the entry  
3 selection circuit is implemented on the router in an operation  
4 comprising the steps of:

5 (a) implementing a function of an entry group typical value  
6 circuit which receives entry group information from the hit

7 record database, and determines typical values of entry usage  
8 ratings, and typical and/or threshold values for zones  
9 constituting entry priority levels;

10 (b) implementing a function of a comparator circuit having  
11 a table which has entry groups linked with entry group typical  
12 values for entry groups present in the cache table, comparing  
13 the typical values of each entry group on the table with typical  
14 values sent from the entry group typical value circuit, and  
15 sending the priority rankings of the entry groups present in  
16 the cache table;

17 (c) implementing a function of an arbitration circuit to  
18 determine the final interchange ranking of the entry groups based  
19 on the priority rankings sent from the comparator circuits; and

20 (d) implementing a function of an entry determiner circuit  
21 for monitoring the available space in the cache table and  
22 for deleting, in case of no available space, the cache table  
23 entries of low ranking entry groups determined by the arbitrator  
24 circuit and sending information to the comparator circuit  
25 on the deleted entry groups for deletion from the cache table.

1 11. A cache table management device used in a router  
2 comprising:

3 a forwarding table for being used to perform longest  
4 prefix match searches of all entries, and

5 a cache table for being used to perform longest prefix  
6 match searches of a portion of the total entries,

7 wherein when an entry in the forwarding table is input  
8 to the cache table, an entry group is selected along with all  
9 child entries of the input entry, and when an entry is extracted

10 from the cache table, an entry group is selected along with all  
11 parent entries of the extracted entry.